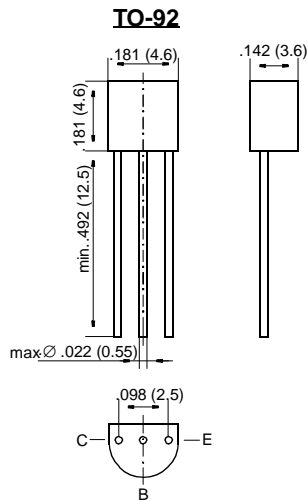


# BC546 THRU BC549

## Small Signal Transistors (NPN)



Dimensions in inches and (millimeters)

### FEATURES

- ◆ NPN Silicon Epitaxial Planar Transistors
- ◆ These transistors are subdivided into three groups A, B and C according to their current gain. The type BC546 is available in groups A and B, however, the types BC547 and BC548 can be supplied in all three groups. The BC549 is a low-noise type and available in groups B and C. As complementary types, the PNP transistors BC556 ... BC559 are recommended.
- ◆ On special request, these transistors are also manufactured in the pin configuration TO-18.



### MECHANICAL DATA

**Case:** TO-92 Plastic Package

**Weight:** approx. 0.18 g

## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Ratings at 25 °C ambient temperature unless otherwise specified

|   |              | Symbol    | Value             | Unit |
|---|--------------|-----------|-------------------|------|
| Collector-Base Voltage                        | BC546        | $V_{CBO}$ | 80                | V    |
|   | BC547        | $V_{CBO}$ | 50                | V    |
|   | BC548, BC549 | $V_{CBO}$ | 30                | V    |
| Collector-Emitter Voltage                     | BC546        | $V_{CES}$ | 80                | V    |
|   | BC547        | $V_{CES}$ | 50                | V    |
|   | BC548, BC549 | $V_{CES}$ | 30                | V    |
| Collector-Emitter Voltage                     | BC546        | $V_{CEO}$ | 65                | V    |
|   | BC547        | $V_{CEO}$ | 45                | V    |
|   | BC548, BC549 | $V_{CEO}$ | 30                | V    |
| Emitter-Base Voltage                          | BC546, BC547 | $V_{EBO}$ | 6                 | V    |
|   | BC548, BC549 | $V_{EBO}$ | 5                 | V    |
| Collector Current                             |              | $I_C$     | 100               | mA   |
| Peak Collector Current                        |              | $I_{CM}$  | 200               | mA   |
| Peak Base Current                             |              | $I_{BM}$  | 200               | mA   |
| Peak Emitter Current                          |              | $-I_{EM}$ | 200               | mA   |
| Power Dissipation at $T_{amb} = 25\text{ °C}$ |              | $P_{tot}$ | 500 <sup>1)</sup> | mW   |
| Junction Temperature                          |              | $T_j$     | 150               | °C   |
| Storage Temperature Range                     |              | $T_S$     | -65 to +150       | °C   |

<sup>1)</sup> Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case

# BC546 THRU BC549

## ELECTRICAL CHARACTERISTICS

|   | Symbol       | Min.      | Typ. | Max.                | Unit    |           |
|---|--------------|-----------|------|---------------------|---------|-----------|
| h-Parameters at $V_{CE} = 5\text{ V}$ , $I_C = 2\text{ mA}$ ,<br>$f = 1\text{ kHz}$ ,<br>Small Signal Current Gain  |              |           |      |                     |         |           |
| Current Gain Group  | A            | $h_{fe}$  | –    | 220                 | –       | –         |
|   | B            | $h_{fe}$  | –    | 330                 | –       | –         |
|   | C            | $h_{fe}$  | –    | 600                 | –       | –         |
| Input Impedance   | A            | $h_{ie}$  | 1.6  | 2.7                 | 4.5     | $k\Omega$ |
|   | B            | $h_{ie}$  | 3.2  | 4.5                 | 8.5     | $k\Omega$ |
|   | C            | $h_{ie}$  | 6    | 8.7                 | 15      | $k\Omega$ |
| Output Admittance   | A            | $h_{oe}$  | –    | 18                  | 30      | $\mu S$   |
|   | B            | $h_{oe}$  | –    | 30                  | 60      | $\mu S$   |
|   | C            | $h_{oe}$  | –    | 60                  | 110     | $\mu S$   |
| Reverse Voltage Transfer Ratio  | A            | $h_{re}$  | –    | $1.5 \cdot 10^{-4}$ | –       | –         |
|   | B            | $h_{re}$  | –    | $2 \cdot 10^{-4}$   | –       | –         |
|   | C            | $h_{re}$  | –    | $3 \cdot 10^{-4}$   | –       | –         |
| DC Current Gain   |              |           |      |                     |         |           |
| at $V_{CE} = 5\text{ V}$ , $I_C = 10\mu A$  | A            | $h_{FE}$  | –    | 90                  | –       | –         |
|   | B            | $h_{FE}$  | –    | 150                 | –       | –         |
|   | C            | $h_{FE}$  | –    | 270                 | –       | –         |
| at $V_{CE} = 5\text{ V}$ , $I_C = 2\text{ mA}$  | A            | $h_{FE}$  | 110  | 180                 | 220     | –         |
|   | B            | $h_{FE}$  | 200  | 290                 | 450     | –         |
|   | C            | $h_{FE}$  | 420  | 500                 | 800     | –         |
| at $V_{CE} = 5\text{ V}$ , $I_C = 100\text{ mA}$  | A            | $h_{FE}$  | –    | 120                 | –       | –         |
|   | B            | $h_{FE}$  | –    | 200                 | –       | –         |
|   | C            | $h_{FE}$  | –    | 400                 | –       | –         |
| Thermal Resistance Junction to Ambient Air  | $R_{thJA}$   | –         | –    | 250 <sup>1)</sup>   | K/W     |           |
| Collector Saturation Voltage<br>at $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$<br>at $I_C = 100\text{ mA}$ , $I_B = 5\text{ mA}$   | $V_{CEsat}$  | –         | 80   | 200                 | mV      |           |
|   | $V_{CEsat}$  | –         | 200  | 600                 | mV      |           |
| Base Saturation Voltage<br>at $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$<br>at $I_C = 100\text{ mA}$ , $I_B = 5\text{ mA}$  | $V_{BEsat}$  | –         | 700  | –                   | mV      |           |
|   | $V_{BEsat}$  | –         | 900  | –                   | mV      |           |
| Base-Emitter Voltage<br>at $V_{CE} = 5\text{ V}$ , $I_C = 2\text{ mA}$<br>at $V_{CE} = 5\text{ V}$ , $I_C = 10\text{ mA}$   | $V_{BE}$     | 580       | 660  | 700                 | mV      |           |
|   | $V_{BE}$     | –         | –    | 720                 | mV      |           |
| Collector-Emitter Cutoff Current<br>at $V_{CE} = 80\text{ V}$<br>at $V_{CE} = 50\text{ V}$<br>at $V_{CE} = 30\text{ V}$<br>at $V_{CE} = 80\text{ V}$ , $T_j = 125\text{ }^\circ\text{C}$<br>at $V_{CE} = 50\text{ V}$ , $T_j = 125\text{ }^\circ\text{C}$ | BC546        | $I_{CES}$ | –    | 0.2                 | 15      | nA        |
|   | BC547        | $I_{CES}$ | –    | 0.2                 | 15      | nA        |
|   | BC548, BC549 | $I_{CES}$ | –    | 0.2                 | 15      | nA        |
|   | BC546        | $I_{CES}$ | –    | –                   | 4       | $\mu A$   |
| BC547   | $I_{CES}$    | –         | –    | 4                   | $\mu A$ |           |

<sup>1)</sup> Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case

# BC546 THRU BC549

## ELECTRICAL CHARACTERISTICS

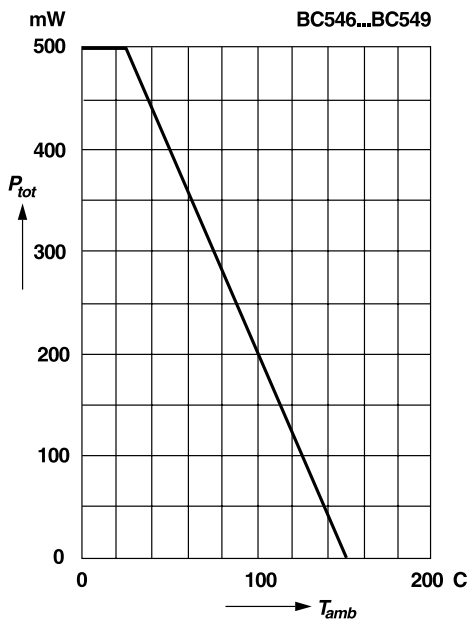
Ratings at 25 °C ambient temperature unless otherwise specified

|   | Symbol    | Min. | Typ. | Max.   | Unit                           |
|---|-----------|------|------|--------|--------------------------------|
| at $V_{CE} = 30\text{ V}$ , $T_j = 125\text{ °C}$ <b>BC548, BC549</b>   | $I_{CES}$ | –    | –    | 4<br>4 | $\mu\text{A}$<br>$\mu\text{A}$ |
| Gain-Bandwidth Product<br>at $V_{CE} = 5\text{ V}$ , $I_C = 10\text{ mA}$ , $f = 100\text{ MHz}$  | $f_T$     | –    | 300  | –      | MHz                            |
| Collector-Base Capacitance<br>at $V_{CB} = 10\text{ V}$ , $f = 1\text{ MHz}$  | $C_{CBO}$ | –    | 3.5  | 6      | pF                             |
| Emitter-Base Capacitance<br>at $V_{EB} = 0.5\text{ V}$ , $f = 1\text{ MHz}$   | $C_{EBO}$ | –    | 9    | –      | pF                             |
| Noise Figure<br>at $V_{CE} = 5\text{ V}$ , $I_C = 200\text{ }\mu\text{A}$ , $R_G = 2\text{ k}\Omega$ ,<br>$f = 1\text{ kHz}$ , $\Delta f = 200\text{ Hz}$ <b>BC546, BC547</b> | F         | –    | 2    | 10     | dB                             |
| <b>BC548</b>  | F         | –    | 1.2  | 4      | dB                             |
| <b>BC549</b>  | F         | –    | 1.4  | 4      | dB                             |
| at $V_{CE} = 5\text{ V}$ , $I_C = 200\text{ }\mu\text{A}$ , $R_G = 2\text{ k}\Omega$ ,<br>$f = 30\dots 15000\text{ Hz}$ <b>BC549</b>  | F         | –    | 1.4  | 4      | dB                             |

## RATINGS AND CHARACTERISTIC CURVES BC546 THRU BC549

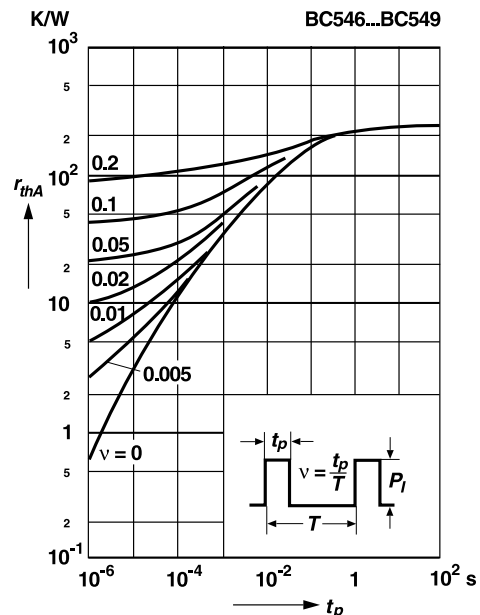
### Admissible power dissipation versus temperature

Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case



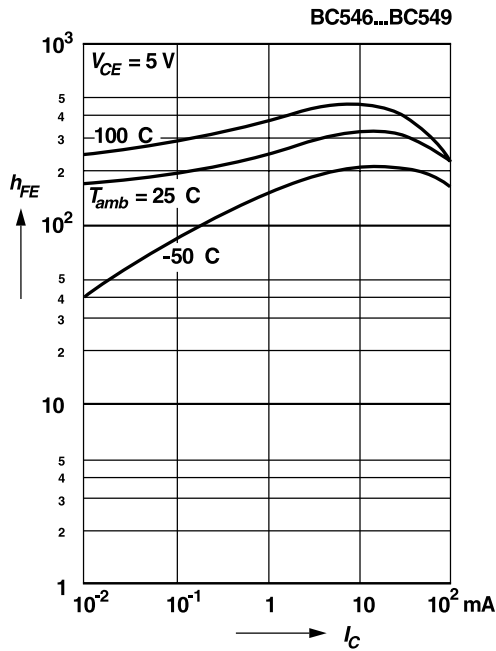
### Pulse thermal resistance versus pulse duration

Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case

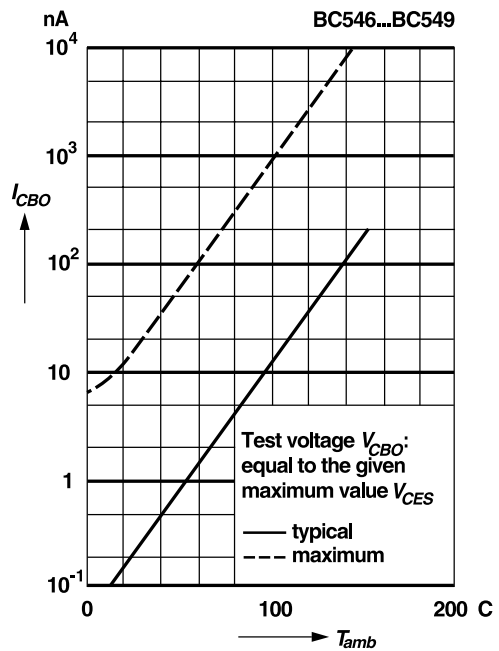


# RATINGS AND CHARACTERISTIC CURVES BC546 THRU BC549

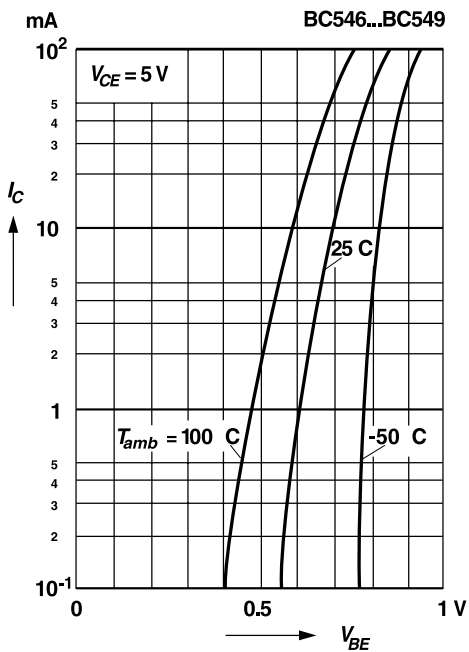
DC current gain versus collector current



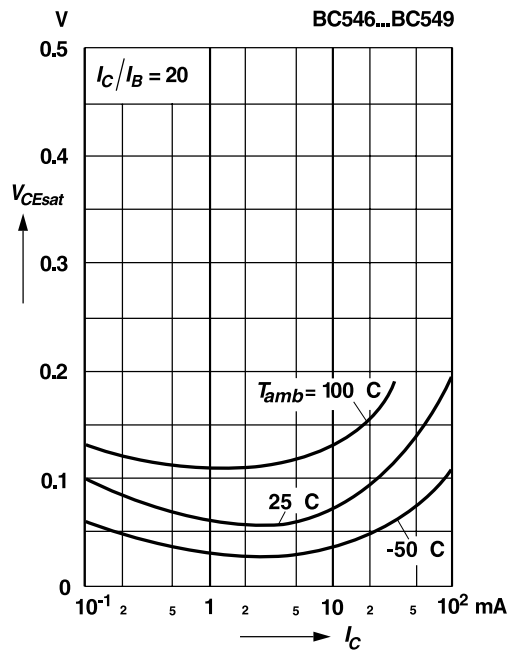
Collector-base cutoff current versus ambient temperature



Collector current versus base-emitter voltage

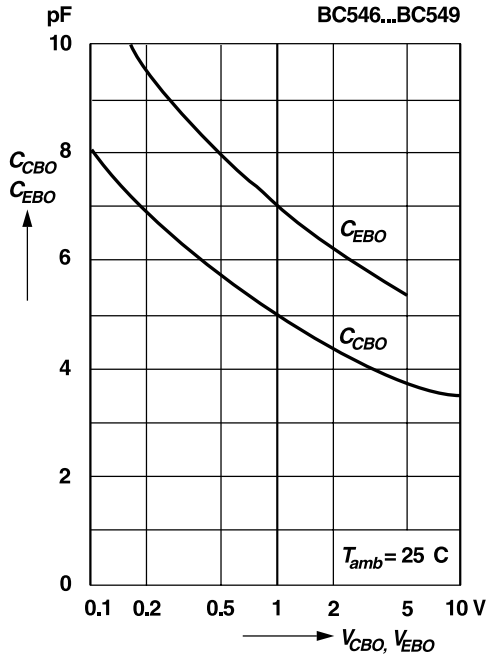


Collector saturation voltage versus collector current

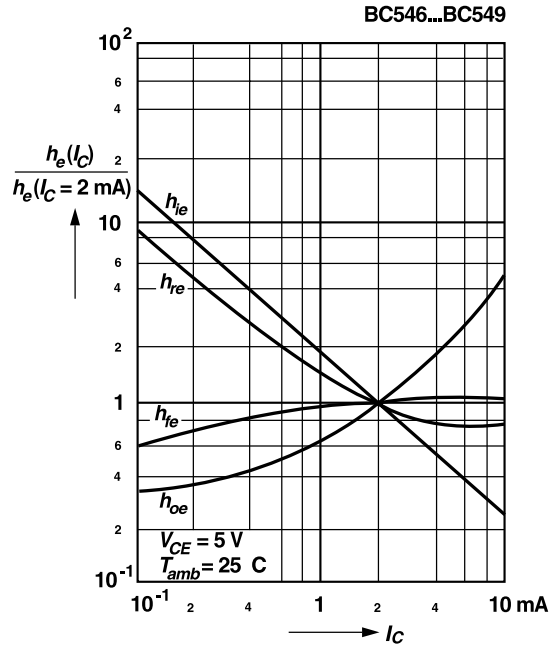


# RATINGS AND CHARACTERISTIC CURVES BC546 THRU BC549

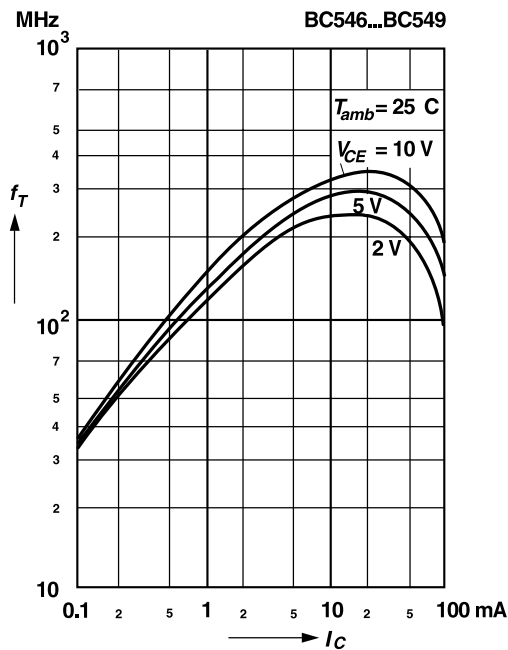
Collector-base capacitance,  
Emitter-base capacitance  
versus reverse bias voltage



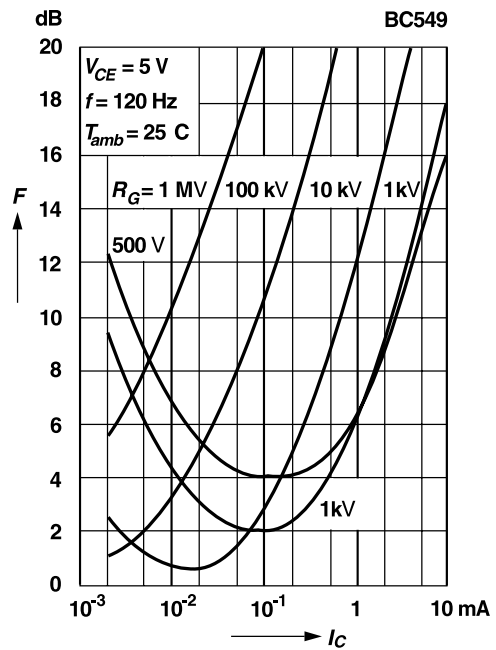
Relative h-parameters  
versus collector current



Gain-bandwidth product  
versus collector current

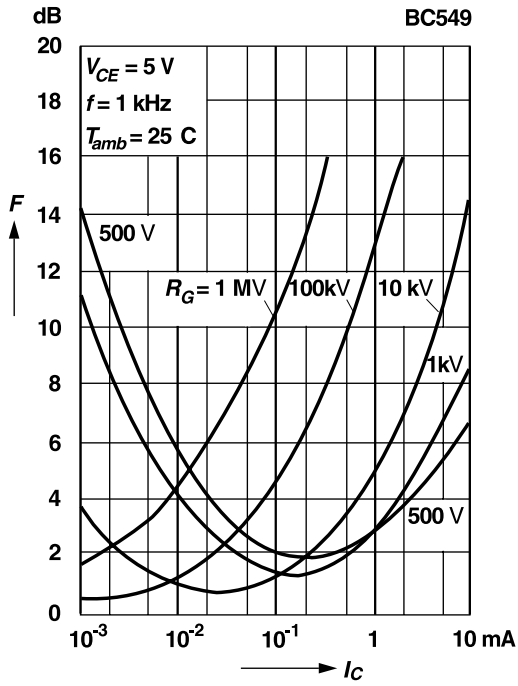


Noise figure  
versus collector current



# RATINGS AND CHARACTERISTIC CURVES BC546 THRU BC549

Noise figure versus collector current



Noise figure versus collector emitter voltage

